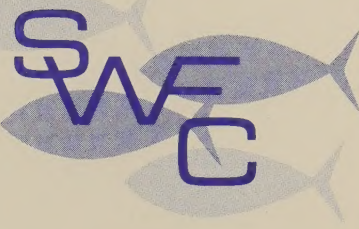




HONOLULU
LA JOLLA
MONTEREY
TIBURON



SOUTHWEST FISHERIES CENTER

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SOUTHWEST FISHERIES CENTER

LA JOLLA, CALIFORNIA

HONOLULU LABORATORY

LA JOLLA LABORATORY

TIBURON LABORATORY

PACIFIC ENVIRONMENTAL GROUP

MONTHLY REPORT - MAY 1982

STATUS OF PUBLICATIONS

Published

Eber, Laurence. 1982. Environmental data contouring program
EDMAP2. NOAA Technical Memorandum, NMFS, NOAA-TM-NMFS-SWFC-18,
54 pp.

Polacheck, Tom. 1982. Local stability and maximum net productivity
levels for a simple model of porpoise population sizes. NOAA
Technical Memorandum, NMFS, NOAA-TM-NMFS-SWFC-17, 14 pp.

Polacheck, Tom. 1982. The relationship between changes in gross
reproductive rate and the current rate of increase for some simple
age structured models. NOAA Technical Memorandum, NMFS, NOAA-TM-
NMFS-SWFC-19, 9 pp.

Smith, Paul E., and Richard W. Eppley. 1982. Primary production
and the anchovy population in the Southern California Bight:
Comparison of time series. Limnol. Oceanogr. 27(1): 1-17.

Two new time series for the Southern California Bight are presented:
anchovy biomass, 1951-1979, and primary production, estimated for the
years 1920-1979 from 15 cruises conducted between 1974 and 1979. Annual
and longer term averages show little relationship to each other except
that values for both were low in the climatically warm water years 1957-
1958. The primary production time series is similar to two existing time
series: CalCOFI zooplankton in the bight and microplankton in Santa
Monica Bay, 1951-1966. Thus estimated primary production does reflect
the carrying capacity of these waters for lower trophic level consumers.

Seasonal averages of anchovy larvae are highest in the winter and spring
quarters when primary production is increasing. Interannual variation

was pronounced in both seasonal average primary production and seasonal average abundance of anchovy larvae. About 50% of the variation in number of anchovy larvae was explained by variation in primary production in the same quarter and zooplankton standing stock three quarters earlier. In 1966, the year of maximum anchovy abundance, the energy expended in anchovy egg production was equivalent to about 1.8% of primary production. The anchovy ration was about 18% of primary production. The ratio of zooplankton biomass to primary production was highest in years when anchovy biomass was greatest.

Smith, Tim D. 1982. Testing methods of estimating range and bearing to cetaceans aboard the R/V D. S. Jordan. NOAA Technical Memorandum, NMFS, NOAA-TM-NMFS-SWFC-20, 30 pp.

Administrative Reports

La Jolla Laboratory

Barrett, Izadore. 1982. Director's report to the 33rd Tuna Conference on tuna and tuna-related activities at the Southwest Fisheries Center, La Jolla, California, for the period May 1, 1981 to April 30, 1982. SWFC Admin. Rep. LJ-82-07.

Graves, J. E., and R. M. Laurs. 1982. Phosphoglucose isomerase phenotypes of inshore and offshore populations of North Pacific albacore. SWFC Admin. Rep. LJ-82-11.

Hewitt, Roger. 1982. Roll, heave and vertical ichthyoplankton tows. SWFC Admin. Rep. LJ-82-01.

Laurs, R. Michael, and Norman Bartoo. 1982. Review of the 1981 U.S. North Pacific albacore fishery. SWFC Admin. Rep. LJ-82-09.

Laurs, R. Michael, and Robert N. Nishimoto. 1982. Results from tetracycline experiment to evaluate otolith daily ring increment method for age determination in North Pacific albacore and from otolith daily ring counts made on whole otoliths to determine length at first birthday. SWFC Admin. Rep. LJ-82-10.

Owen, Robert W. 1982. Manual of standard procedures for CalCOFI-69 plant pigment and production measurements. SWFC Admin. Rep. LJ-82-03.

Owen, Robert W. 1982. Manual of standard procedures for CalCOFI-72 plant pigment and production measurements. SWFC Admin. Rep. LJ-82-04.

Owen, Robert W., and Carol A. Kimbrell. 1982. Standard procedures for fluorometric determination of phytoplankton pigments at SWFC since 1973. SWFC Admin. Rep. LJ-82-05.

Approved by Center Director

Dotson, Ronald C. and John E. Graves. Biochemical identification of a bluefin tuna establishes a new California size record. For consideration for publication in California Department of Fish and Game Quarterly.

Graham, J. B. and R. M. Laurs. Metabolic rate of the albacore tuna, Thunnus alalunga. For consideration for publication in Marine Biology.

Matsumoto, Walter M., Robert A. Skillman, and Andrew E. Dizon. Synopsis of biological data on skipjack tuna, Katsuwonus pelamis. For consideration for publication in NOAA Technical Reports, NMFS Circular.

Methot, Richard D., Jr. Seasonal variation in survival of larval Engraulis mordax estimated from the age distribution of juveniles. For consideration for publication in Fishery Bulletin, U.S.

Perrin, W. F. Patterns of geographical variation in small cetaceans. For publication in the Conference Papers - 3rd Int. Theriological Congress, Helsinki, Finland. Acta Zool. Fennica.

HONOLULU LABORATORY

INSULAR RESOURCES INVESTIGATION

Northwestern Hawaiian Islands (NWHI) Fishery Atlas Drafts Completed

Richard N. Uchida, Leader of the Insular Ecosystem Study Task, has reviewed and revised various sections of the "Fishery atlas of the Northwestern Hawaiian Islands" which is being prepared in collaboration with several researchers in the Task. Contributions to the atlas prepared during the month included abbreviated synopses on hapuupuu (Epinephelus quernus) by research assistant Michael P. Seki, onaga (Etelis coruscans) by research assistant Alan R. Everson, ono (Acanthocybium solandri) by research assistant Steven H. Kramer, kawakawa (Euthynnus affinis), skipjack tuna (Katsuwonus pelamis), yellowfin tuna, (Thunnus albacares), bigeye tuna (T. obesus), and mahimahi (Coryphaena hippurus) by James H. Uchiyama, Fishery Biologist; and opakapaka (Pristipomoides filamentosus) and greater amberjack (Seriola dumerili) by research assistant Robert L. Humphreys, Jr.

Sexual Maturity of Kona Crab Studied

This month research assistant James H. Prescott collected 95 kona crab (Ranina ranina) in 9 to 38 m of water off Ewa Beach, Oahu, Hawaii, for studies on size at first maturity of this species. Prescott reported that a number of morphological features were measured, some of which appear to show changes in allometry that may be associated with the onset of sexual maturity.

Manuscript on Ciguatera Undergoing Revision

Research assistant Robert L. Humphreys, Jr. has begun the second revision of a manuscript, "Ciguatera and the feeding habits of the greater amberjack, Seriola dumerili, in the Hawaiian Archipelago," which he co-authored with research assistant Steven H. Kramer. The study concerns a comparative food study of ciguatoxic and nonciguatoxic amberjack from the lower main islands, as well as nonciguatoxic fish from the Northwestern Hawaiian Islands (NWHI) and the lower main Hawaiian Islands. The study revealed that large amberjack fed predominantly on opelu (Decapтерus sp.) regardless of area and ciguatoxicity. Among smaller amberjack, opelu again predominated in the diet with two exceptions: those fish caught in the main Hawaiian Islands and judged to be ciguatoxic, and those caught in waters of the NWHI, regardless of ciguatoxicity levels, fed to a greater extent on bottom-associated fauna. From the results of this study, Humphreys and Kramer suggested several hypotheses that should be tested in future studies.

Manuscripts on Northwestern Hawaiian Species Prepared for Publication

This month research assistant James H. Prescott revised his manuscript, "Size at maturity in the Hawaiian spiny lobster, Panulirus marginatus, from changes in relative growth," and research assistant Michael P. Seki revised and sent out for review his manuscripts, "Food and feeding habits of the pig ulua, Pseudocaranx dentex, in the Northwestern Hawaiian Islands," and "Food and feeding habits of the sea bass, Epinephelus quernus, in the Northwestern Hawaiian Islands."

Research assistant Steven H. Kramer prepared a note on a new species of hagfish caught during shrimp-trapping operations during cruise 80-05 of the NOAA research vessel, Townsend Cromwell, in waters of the Northwestern Hawaiian Islands. The note will be submitted to Pacific Science.

First Biological Cruise in Marianas Nearing Completion

The first biological cruise conducted under the Resource Assessment Investigation of the Mariana Archipelago (RAIOMA) program is nearing completion. Task leader Dr. Jeffrey J. Polovina, fishery biologist Robert B. Moffitt, and research assistant Victor A. Honda are onboard the NOAA research vessel, Townsend Cromwell, taking fishery resource samples. The cruise has been undertaken in collaboration with researchers from the University of Guam, including Dr. Steven S. Amesbury. Many islands and banks in the Marianas have already been successfully sampled and more will be visited during the next two cruises as the RAIOMA program continues field work throughout the summer months.

Two of the resources targeted for assessment are being taken in reasonable quantities. Trap catches of the large caridean shrimp (Heterocarpus laevigatus) have been high (5 kg per trap-night) at a number of sites, and landings of bottom fish have also been good (6-7 fish per line-hour). An intensive fishing experiment over a period of 3 days on a small isolated pinnacle located west of Saipan was also successful in detecting a declining catch rate with continued fishing effort. Treatment of these data by methods of fishing success appears feasible and should provide valuable information. Catches of mackerel scad (Selar crumenophthalmus), the third target species, have been disappointing to date. Poor landings are likely due to seasonal variation in availability. This species is known to form large schools in nearshore waters in the Marianas during the mid-summer months. The next RAIOMA cruise begins June 4 and will involve Dr. Stephen Ralston, Fishery Biologist, and research assistants A. Everson and R. Humphreys, Jr.

Samples Collected on RAIOMA Bathymetric and Hydrographic Cruise Analyzed

Research assistant Bert S. Kikkawa has analyzed chlorophyll, phaeopigment, and plankton biomass samples collected on the bathymetric and

hydrographic cruise (TC-82-02) of the R/V Townsend Cromwell in the Mariana Archipelago in April. This was the second of a series of cruises by the Cromwell as part of the Resource Assessment Investigation of the Mariana Archipelago (RAIOMA) program. (Three biological cruises are also planned. Please see the preceding article for additional details.)

Kikkawa found that the mean integrated concentration of chlorophyll and phaeopigment in the Marianas was 4.06 and 9.96 mg/m², respectively. Surface plankton and larval fish biomass in oceanic waters was about 0.15 mg/m² less than that (0.36 mg/m²) in the nearshore waters. Zooplankton biomass was about 4.689 mg/m³ and the phytoplankton biomass about 8.615 mg/m³ in the upper 150 m of the epipelagic zone. The extinction coefficient of light attenuation in the area ranged from 0.031 to 0.068/m absolute (mean, 0.053/m).

Deep-Sea Submersible Used in Fish Studies

Fishery biologist Reginald M. Gooding reports that he and Dr. Stephen Ralston have been participating in diving operations aboard the deep-sea submersible, Makali'i, operated by the University of Hawaii's Undersea Research Laboratory. To date three dives have been completed on the "fingers" of Penguin Bank off Molokai in water depths ranging from 65 to 400 m. Gooding and Ralston are focusing on deepwater snapper and grouper species and are making observations on their behavior, shelter utilization, depth distribution, interactions with fishing gear, as well as observations on submarine geology. A device has been constructed for collecting deepwater fish species with an ichthyocide (rotenone) but it remains to be tested under field conditions. All observations, both visual and aural, are being recorded on black-and-white as well as color videotape. Seven or eight more dives are scheduled between now and September.

Ocean Thermal Energy Conversion (OTEC) Research Proposal Prepared

This month fishery biologist Richard N. Uchida conducted a literature search and assembled information on potentially adverse environmental impacts arising from construction of OTEC facilities and on recommended mitigating measures. The information was used to prepare a proposal for a Honolulu Laboratory project, "A proposal to study the potential impact of ocean thermal energy conversion facilities on the marine environment."

* * * * *

Fishery biologist Richard N. Uchida has begun gathering information and data for two reports that will be presented at the South Pacific Commission meeting to be held in Noumea, New Caledonia, in August. He also revised Part II of the Guam/Northern Marianas Background Document and reviewed a manuscript, "Zooplankton abundance and distribution in the Northwestern Hawaiian Islands," prepared by fishery biologist Paul M. Shiota.

Research assistant Steven Kramer is preparing a synopsis of the octopus, Octopus cyanea, and will do a literature search on the uku, Aprions virescens.

FISHERY MANAGEMENT RESEARCH PROGRAM

Hawaii Landings of Skipjack Tuna Continue Below Long-Term Average

The May 1982 Hawaii landings of skipjack tuna were estimated at 144 metric tons (mt), which is 68 mt below the May 1981 landings and 347 mt below the 1964-79 long-term average for May. The cumulative landings from January through May were estimated at 363 mt, which is 192 mt below the 1981 landings for the same period and 732 mt below the 1964-79 long-term average for the same period (Figure 1).

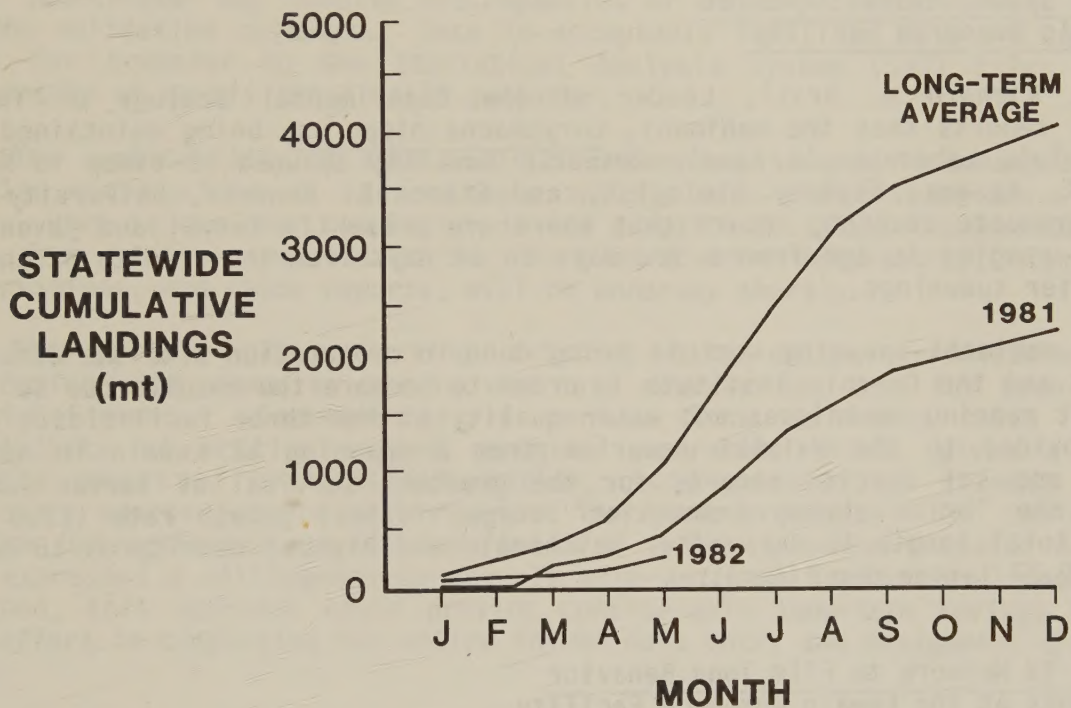


Figure 1. Cumulative landings in the Hawaiian skipjack tuna fishery.

User's Guide for Microcomputer Prepared

David C. Hamm, Computer Systems Analyst, has developed an in-house user's guide for data transmission from the Apple microcomputer to the PDP 11/70 via dial-up modem using Visiterm software. The user's guide describes the steps required to transfer data files or word processing files to the minicomputer. It also describes how to convert Apple word processing files into Word-11 files. This means that documents written by the scientific staff using Apple can be transferred to Word-11 files to facilitate secretarial editing and formatting. This will also permit Apple-originated files to be printed from Word-11 files on the letter quality impact printer or directly on the minicomputer's line printer.

PELAGIC RESOURCES INVESTIGATION

Mahimahi Spawn Several Times at the Kewalo Research Facility

Dr. Richard W. Brill, Leader of the Experimental Ecology of Tunas Project, reports that the mahimahi, *Coryphaena hippurus*, being maintained at the Honolulu Laboratory's Kewalo Research Facility spawned 13 times in May. Thomas K. Kazama, Fishery Biologist, and Sharon D. Hendrix, University of Hawaii graduate student, report that there are presently larval and juvenile mahimahi ranging in age from a few days to 44 days from the results of these and earlier spawnings.

The mahimahi spawning work is being done in cooperation with the Waikiki Aquarium and the Oceanic Institute in order to compare the results due to the different rearing techniques and water quality at the three facilities. The eggs provided to the Waikiki Aquarium from a spawning at Kewalo in April hatched and set species records for the greatest survival of larvae (20%) through the "brine shrimp transition" stage, fastest growth rate (12.6 mm average total length 16 days after hatching), and highest density at 16 days of age (0.77 larvae per liter).

National TV Network to Film Tuna Behavior Experiments at the Kewalo Research Facility

Dr. Richard Brill, Fishery Biologist, and Michael M. Walker, University of Hawaii graduate student, report that the CBS Television Network in New York recently contacted them about the network's interest in filming a segment on the behavioral experiments being conducted at the Honolulu Laboratory's Kewalo Research Facility which demonstrate a magnetic compass sense in yellowfin tuna, *Thunnus albacares*. CBS would like to use the footage for their popular science show, "Universe." Representatives from CBS will arrive in Honolulu on

June 26 to begin filming. Walker is currently training two yellowfin tuna for the filming.

DATA MANAGEMENT AND TECHNICAL SERVICES

RAIOMA Data Management System Developed

Fletcher V. Riggs, Fishery Biologist, reports that an important milestone was reached this month in the development of the data entry and management system for the Resource Assessment Investigation of the Mariana Archipelago (RAIOMA). Ronald C. Antinoja, Computer Technician, has completed the data entry, validation, and transfer subsystems for the shrimp trap report data which, in addition to processing the shrimp data, will serve as models for the remaining data types to enter the system. Using USER-11, a flexible interactive data entry, management, and report writing software package on the East-West Center PDP 11/70, the data are first keyed, then verified, then passed through an extensive validation process whereby the data entry personnel of the Data Management and Technical Services group and the RAIOMA data coordinator may resolve discrepancies or other potential errors flagged by the validation software. Once in acceptable form, the data are copied to tape for transfer to the Statistical Analysis System (SAS) files on the University of Hawaii IBM 370/158 computer.

The applicability of this model to other data sources is enhanced by the modular construction of its software and its menu-driven interface with the user. Work is now near completion in the adaption of this prototype to handle data from handline catch reports. Work on a third data source, night-light observations, and catch reports, will be underway shortly.

The process of converting existing data entry, verification, and validation subsystems to handle new data sources has thus far been rather straightforward. Consequently, a serious look is being taken at the possibility of writing several program generators which, given a rather limited amount of critical information, could generate all or most of the necessary source program text required for these processes. Dr. David Pager of the University of Hawaii Department of Information and Computer Sciences has expressed a willingness to consult with Antinoja in its development. If adopted, this approach could provide considerable long-term savings in time and effort in completing the entire RAIOMA data entry and management system.

LA JOLLA LABORATORY

Coastal Fisheries Resources Division

ECOLOGY AND TAXONOMY OF FISHES OF THE CALIFORNIA CURRENT

Plans for Ahlstrom Memorial Symposium Finalized

Dr. Geoff Moser, Program Leader, reports that the symposium entitled "Ontogeny and Systematics of Fishes," honoring the late Elbert H. Ahlstrom, Senior Scientist at the Southwest Fisheries Center, will be held in La Jolla, California, August 15-18, 1983. A steering committee consisting of Moser as Chairman, Drs. Daniel Cohen and Arthur Kendall (Northwest and Alaska Fisheries Center, NMFS), Michael Fahay (Northeast Fisheries Center, NMFS), Dr. William Richards (Southeast Fisheries Center, NMFS), and Dr. Sally Richardson (Gulf Coast Research Laboratory) met in October 1981 and February 1982 to plan and organize the symposium.

During the symposium, 70 contributors will present a total of 78 papers dealing with the taxonomic and systematic aspects of the early life history of fishes. Following the symposium, the steering committee will edit the manuscripts and compile them into a book to be published in 1984. For each major group of fish there will be a survey of what is known of its ontogeny, an assessment of the principal and diverse taxonomic characters of its early life history stages, and a set of illustrations that will serve as a broad-spectrum identification guide. This will provide the background for an assessment of systematic relationships of each group that will be based largely on ontogenetic characters.

SURVEY SYSTEMS DEVELOPMENT AND EVALUATION

Sardines Spawn at Temperatures Lethal for Embryos

Fishery biologist Dr. Paul Smith reports that cooperative work he has conducted with fishery biologist Dr. Geoff Moser and Moser's staff in the Southwest Fisheries Center's Ecology and Taxonomy Program, confirms the existence of substantial sardine spawnings at water temperatures known to be lethal for sardine embryos. Of 1,612 sardine egg samples on historical data files, 106 are from lethal temperatures below 13°C (Figure 1). The lowest recorded temperature in the data analyzed previously was 11°C, but several samples of eggs collected in 1964 were taken in waters ranging to temperatures as low as 10°C. In 1964, Dr. Reuben Lasker, Chief of the Coastal Fisheries Resources Division, established the fact that embryos incubated below 13°C failed to develop a functional jaw and pigmented eyes. Spawning habitat

selection (if any) by the sardine does not reflect a precise behavioral mechanism for determining lethal temperatures for its offspring.

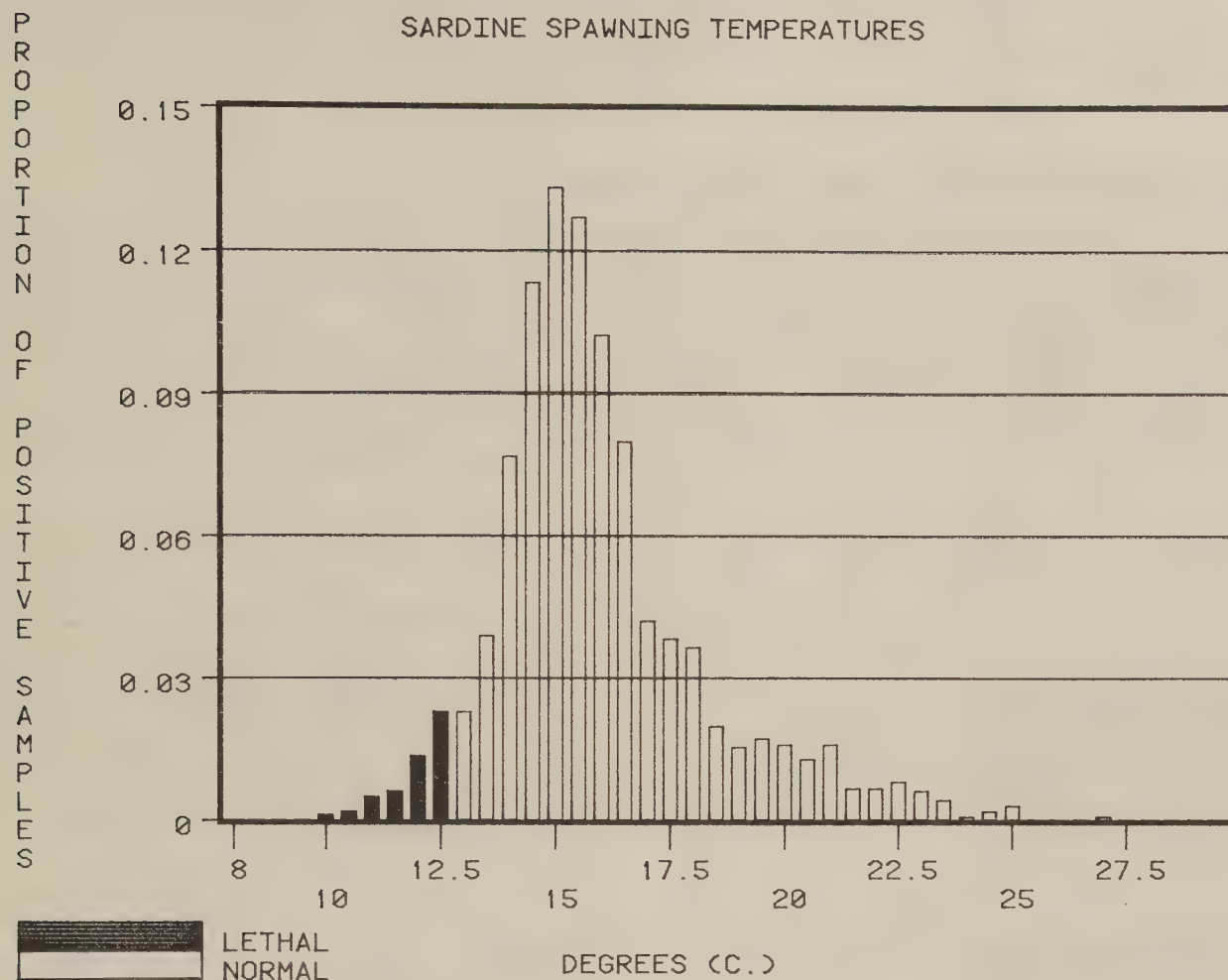


Figure 1. Comparison of temperature range to the portion of sardine eggs within positive samples (i.e., samples which contain sardine eggs).

COMMERCIAL AND RECREATIONAL FISHERIES RESEARCH FOR MANAGEMENT

Anchovy Management Plan Revision on Schedule

Alec MacCall, California Department of Fish and Game Biologist stationed at the La Jolla Laboratory, reports that work on the 1982 anchovy spawning biomass estimate is proceeding on schedule. Laboratory processing of anchovy gonads has been completed, and the data are on the computer and are now being edited. The biomass estimate will be reviewed sometime in early July at an open meeting at the Southwest Fisheries Center.

According to MacCall, a schedule for development of the revised anchovy management plan has been established and a complete first draft will be

presented to the Pacific Fishery Management Council (PFMC) in November. A revised draft will be presented to the Council in January 1983, and will be sent out for public review. The PFMC will select management options in March 1983 and send the plan to Washington, D.C. If this schedule is adhered to with no delays, the revised plan will be implemented for the 1983-84 fishing season.

Age Composition of Anchovy Being Analyzed

Dr. Richard Methot, Fishery Biologist, is currently reanalyzing the age composition of anchovy sampled by the California Department of Fish and Game's (CDF&G) Sea Survey program from 1966 to the present. The current perception of the historical age compositions is based solely on the subsamples of fish which had been aged. Methot will use additional information--length distributions, size of catches, and depth stratification--to recompute these age compositions. In particular, he hopes to estimate the relative abundance of younger age classes that were underrepresented in the previous estimates.

According to Methot, the computer programs needed to analyze this data base have been written. Donna Mallicoate, Statistician at the Southwest Fisheries Center's Pacific Environmental Group, is familiar with this data base and traveled to the Center to assist Methot in developing a FORTRAN program which reads the raw files provided by Ken Mais (CDF&G) and selects the appropriate information. Methot has written a FORTRAN program which accesses these reformatted data and calculates age-length keys and length distributions. Various sample weighting schemes, including catch rate and SONAR information, are being explored in calculating length distributions for each cruise. These programs should be run on the entire data set during early June.

Paper on Seabird-Fishery Interactions Revised

Alec MacCall, California Fish and Game Marine Biologist stationed at the La Jolla Laboratory, is completing the final revision of his paper, "Seabird-fishery trophic interactions in eastern Pacific boundary currents." The paper, presented by MacCall at the 8th Annual Meeting of the Pacific Seabird Group, Symposium in Seabird-Commercial Fisheries Interactions, January 6-9, 1982 in Seattle, Washington, has been reviewed by the symposium editor and will be included in a collection of papers to be published later this year in the Special Publications series of the Canadian Wildlife Service.

In the paper, MacCall notes that while California and Peru have very similar fish communities, the seabird communities which feed upon them are less similar. The forage base cannot be considered outside the context of the natural patterns of forage availability. This forage base is characterized by extreme variability, serial correlation over years, geographic expansion, and species replacement events. The El Niño in Peru presents special reproductive and survival problems to seabirds. MacCall states that the seabird impact on fish abundance may have been very significant in Peru, but is probably small in California. Fisheries themselves may have an impact on seabirds by

reducing food availability with a subsequent decrease in reproductive success. MacCall's analysis using a simulation model suggests that a variable food supply results in variable seabird abundance. Fisheries may reduce food to levels below those necessary to sustain seabird populations, but patterns of decline may easily be misinterpreted due to long trends of population increase and decrease.

MacCall also completed a draft paper describing behavior of a production model with spatial diffusion; this paper has been distributed for review. He has begun writing some sections of a paper entitled "New ideas on the fluctuations of the clupeoid stocks off California," which is being co-authored with Dr. Reuben Lasker, Chief of the Coastal Fisheries Resources Division; Lasker will present the paper at the Joint Oceanographic Assembly meeting in Halifax, Nova Scotia in August.

COASTAL EASTERN PACIFIC FISHERIES ENVIRONMENT INVESTIGATIONS

Papers Presented at Seventh North Pacific Albacore Workshop

Oceanographers Dr. Michael Laurs and Ron Lynn participated in the Seventh North Pacific Albacore Workshop held at the La Jolla Laboratory of the Southwest Fisheries Center, May 20-25, 1982. (Please see page 20, this issue, for more information on the workshop.) Laurs, in collaboration with other scientists, prepared and discussed six working papers at the workshop: 1) "A review of the 1981 U.S. North Pacific albacore fishery" (co-authored with Dr. Norman Bartoo, Fishery Biologist, SWFC); 2) "Results from a tetracycline experiment to evaluate the otolith daily ring increment method for age determination in North Pacific albacore and from otolith daily ring counts made on whole otoliths to determine length at first birthday" (co-authored with Robert Nishimoto, Fishery Biologist, SWFC); 3) "Metabolic rate of albacore tuna" (co-authored with Jeffrey Graham, Scripps Institution of Oceanography); 4) "Exploratory albacore longline fishing in the eastern Pacific" (co-authored with Lynn, Nishimoto, oceanographer Ken Bliss, fishery biologist Dave Holts, and biological technician Ron Dotson, SWFC); 5) "Phosphoglucose isomerase phenotypes of inshore and offshore populations of North Pacific albacore" (co-authored with Dr. John Graves, NOAA/NRC Fellow, SWFC, who presented the talk); and 6) "Small-scale movements and vertical distribution of albacore" (co-authored with Dotson).

Satellite Infrared Thermal Images Examined

Ron Lynn, Oceanographer, and Jan Svejksky, student at Scripps Institution of Oceanography and part-time satellite computer specialist at the La Jolla Laboratory, have examined a series of NOAA-6 VHRR (very high-resolution radiometer) satellite images collected contemporaneously with an anchovy egg and larvae survey conducted aboard the NOAA research vessel, David Starr Jordan.

Four images were selected to test new processing programs employing state-of-the-art methodology for image registration, noise filtering of channel 3 (3.7μ), and derivation of absolute temperature. The images selected were from late November 1980 during a period in which "Santa Ana" (dry easterly winds) conditions created an extensive cloud-free, dry-air zone over the Southern California Bight. At this time, Jordan was actively collecting surface temperature measurements and hydrographic casts in the Bight. The four images are consecutive: day-night-day-night. When used with an accurate registration scheme, this sequence allows investigators to create day-to-night and day-to-day temperature differences. The sensor noise which is characteristic of channel 3 was greatly reduced by using a filtering technique during processing. However, when image-to-image temperature differences were calculated, the residual noise interfered with the signal.

Lynn and Svejksky concluded that absolute temperature calculations, which depend upon channel differences, may be useful for gross regions but will contain some noise that could affect small regions. The quality of images from channel 3 is variable depending upon the age of the sensor: the longer a sensor is in operation the more likely the image will be degraded. Image-to-image temperature differences using channel 4 (11μ) provide very clear patterns and daily movement of thermal fronts is discernible. In addition, day-to-night ocean temperature differences (0.75°C) were found to exceed day-to-day trends (0.5°C), with the exception of frontal features.

This study shows that an improved capability to handle infrared data is in hand. The application of these processing routines to particular images also indicates that day-night differences need to be taken into account during analysis because a preliminary examination of the hydrographic data collected does not reveal a diurnal variation of the magnitude mentioned above. Further study is needed to understand the nature of the diurnal differences in the satellite imagery.

In early May, oceanographer Dr. R. Michael Laurs gave briefings in Washington, D.C. at NMFS Headquarters, NASA Headquarters, and National Weather Service Headquarters, describing recent results from research being conducted at the La Jolla Laboratory on satellite remote sensing applications to fisheries studies. This research is yielding exciting findings important in the definition of marine habitats for North Pacific albacore and northern anchovy, and which have potential for other species as well.

Presentations on Albacore Research Given at Annual Tuna Conference

Three presentations dealing with various aspects of albacore tuna research were given by Dr. R. Michael Laurs, Leader of the Fisheries Environment Investigations program, at the 33rd Tuna Conference held at Lake

Arrowhead, California, May 16-19, 1982 (please see page 21, this issue, for additional conference details). The talks by Laurs included 1) "Results from an investigation to evaluate the potential for establishing a U.S. fishery on North Pacific albacore during the winter months in the eastern Pacific using longlines" (as reported on pages 17-21 of the April 1982 issue of the SWFC Monthly Report), 2) "The vertical distribution and small-scale movements of albacore tuna in relation to oceanographic tracking, oceanographic sampling, and satellite imagery" (co-authored with fishery biologist Dr. Andrew Dizon and biological technician Ron Dotson, SWFC, and NOAA Corps officer Al Jemison, Northwest and Alaska Fisheries Center, NMFS), and 3) "Albacore ageing using the otolith daily ring increment method" (co-authored with fishery biologist Robert Nishimoto, SWFC).

Series of Albacore Workshops Given to Commercial Fishermen

During late April, Dr. R. Michael Laurs, Oceanographer, presented a series of workshops to commercial albacore fishermen in Oregon. The workshops were sponsored by the Oregon State University Sea Grant Program and were given in Astoria, Newport, Coos Bay, and Brookings, Oregon. The topics covered at the workshops included the potential for longlining for albacore in the eastern Pacific during winter months, results from acoustic tracking experiments on the vertical distribution of albacore, applications of satellite remote sensing imagery to investigations involving albacore tuna, and information on albacore migration patterns and biology. A similar workshop was presented in Corvallis at Oregon State University which was attended by a number of marine scientists as well as fishermen. A total of about 225 fishermen and fishery scientists attended the workshops. According to comments and letters received from participants, the workshops were extremely well received and requests were made to hold similar workshops in the future.

Overviews of Research at La Jolla Laboratory Given at Meeting

On May 19, oceanographer Ron Lynn and fishery biologist Dr. Paul Smith presented overviews of research being conducted by Coastal Division personnel at the Southwest Fisheries Center's La Jolla Laboratory to a meeting of the Sea Grant Marine Advisory Staff at Scripps Institution of Oceanography. Lynn's presentation included the albacore ageing (otolith) project, the tracking of acoustically tagged albacore, the exploratory albacore longlining surveys and the efforts at applying satellite remote-sensed data to fisheries. Smith discussed the traditionally-managed fishery stocks and the new unmanageable fisheries on pelagic schooling fishes. He emphasized that the collapses of European, Japanese, and African sardines and the Peruvian anchoveta were an inherent feature of coastal pelagic schooling fish caused by the type of fishery, the biology of the fishes, and the variable environment.

Oceanic Fisheries Resources Division

Tuna Industry Representatives Attend Briefing
on SWFC Tuna-Porpoise Research

On May 27, Center Director Dr. Izadore Barrett and Dr. Gary Sakagawa, Chief of the Oceanic Fisheries Resources Division, convened a briefing for representatives of the U.S. yellowfin tuna industry on tuna-porpoise research activities conducted at the Southwest Fisheries Center. Industry representatives included August Felando, American Tunaboat Association (ATA); George Sousa, boat owner and ATA member; Frank Alverson, Gordon Broadhead, and Jim Lambert, Living Marine Resources; Burney Fink and John DeBeer, Van Camp Sea Food Company; John Royal, International Longshoremen's and Warehousemen's Union (San Pedro Fishermen's Union); and Anthony Nizetich, Star Kist. The purpose of the briefing was to inform industry members of current research activities and the direction which the SWFC's porpoise-tuna research team is planning to follow to assess the status of dolphin stocks involved in the yellowfin tuna fishery in 1984 and beyond.

Sakagawa's introductory overview of the objectives of the program, presentation of the 1982-1985 schedule of events, and brief descriptions of the basic assessment model were followed by a more detailed review of the biological studies by Dr. William Perrin, Leader of the Marine Mammal Biology Program. Perrin explained how numerous projects were interrelated and how the basic biological findings are needed for the analyses in 1984. Dr. Al Myrick, Leader of the Age Determination Project, described the progress being made in the age determination studies of marine mammals. Dr. Tim Smith, Leader of the Marine Mammal Assessment and Monitoring Program, completed the review with a discussion of the major elements comprising population studies, such as work on density of dolphin schools, school size and composition, sighting methodology problems, and population dynamics model. Industry representatives voiced their concern and offered numerous suggestions on how to improve the assessments. The briefing proved very informative for SWFC and industry personnel alike.

A similar briefing is being scheduled for representatives from the environmental/conservation community.

MARINE MAMMAL BIOLOGY PROGRAM

Age Determination and Vital Rates Study of
Northern Offshore Spotted Dolphin--An Overview

The major responsibility of the Marine Mammal Biology Program and the Marine Mammal Monitoring and Assessment Program at the Southwest Fisheries Center is to assess the degree to which porpoise stocks are affected by the tuna purse seine fishery in the eastern tropical Pacific Ocean. This

assessment is an ongoing process which requires updating results as new data, or new techniques for analyzing data, become available. The current emphasis is on the northern offshore spotted dolphin (*Stenella attenuata*), and among the first steps necessary in the assessment analyses (e.g., the mortality and reproductive rates of the population) is age determination of the specimens involved.

Aleta Hohn, Zoologist, reports that since the last spotted dolphin vital rates studies were conducted in the mid-1970's, the state of the art in cetacean age determination techniques has been greatly refined. New preparation techniques have been developed which enhance the layering pattern in the dentine and cement of odontocete teeth for enumeration. More importantly, results from known-aged and tetracycline-marked dolphins of several species have enabled Hohn and Dr. Al Myrick, Leader of the Age Determination Project, to define better the "growth layer groups" (GLGs) in dentinal tissue. Hohn believes that these results can be extrapolated to obtain numbers which closely approximate the actual ages of the spotted dolphin specimens. These ages vary considerably from those obtained during the 1970's analyses, due in large part to new techniques which increase the number of visible GLGs. Previously the maximum number of countable GLGs averaged 16-18; now more than 30 can be counted.

The purpose of the current northern offshore spotted dolphin age determination project is to ascertain ages for a large sample of specimens representative of the total sample of northern offshore spotted dolphins in the collections at the SWFC. The sample consists of the first 800 males and 800 females which appeared on a randomly-generated listing of the entire sample of 8,000-10,000 spotted dolphin specimens from which teeth are available.

Teeth from each of the selected 1,600 specimens were prepared by biological technicians Priscilla Sloan, Drew Stanley, and Makoto Kimura in the Age Determination Lab. During this process, each tooth is decalcified, cut into 24-micrometer thin sections on a freezing microtome, stained in haematoxylin, and then mounted on a microscope slide. The specific preparation techniques were refined throughout the project (for example, the mounting media and decalcification times were changed). Many of the specimens were prepared a second time using the refined methods, so more than one tooth from a specimen may have been used. At least three readings were made for each specimen (not necessarily on each preparation) by two readers, Myrick and Hohn, over an 18-month period.

Information from the readings are recorded on a Tooth Reading Record coding form (Figure 1) for input of data into a computer data base. Included on this form are specimen number; preparation data such as preparation date, tooth number, and mounting medium; descriptions of the preparation ("Condition of Slide") such as stain faded or section off-center; descriptions of inherent properties of the tooth such as irregular GLGs or indistinct cement; records of the reader, microscope, reading date, and reading number of the day; and GLG counts for dentine and cement and an "Age Recorded" for each specimen based on the GLG counts.

TOOTH READING RECORD														
SPECIMEN, GENERAL									CONDITION OF SLIDE (1:Yes, blank:No/Unrecorded)					
Note: if all 7 elements are blank, the slide is good.														
Reading of Day	* Specimen No.	Tooth of Specimen	Slide of Tooth	Preparation Date	Preparator	Tooth Treatment	Mounting Medium	Faded	Shrinkage	Off Center	Dark	Light	Shredded	Unknown
1	4	11	12	13	19	21	22	23	24	25	26	27	28	29
READING, GENERAL									AGE RECORDED					
Note: (99.9: unknown, not recorded)														
* Reader	Request	Reading Date	Microscope	Pulp Cavity				Best	High	Low				
Code	Remount/Recut	yr. mo. day	I.D.	Condition										
30	32	33	39	41				42	45	48				
DENTINAL						CEMENTAL								
Dentinal GLG Condition			* Number of Dentinal GLG's			Cemental GLG Condition			* Number of Cemental GLG's					
(1:Yes, blank:No/Unrecorded)			(99.9: unknown, not recorded)			(1:Yes, blank:No/Unrecorded)			(99.9: unknown, not recorded)					
indistinct	irregular	pearls	Best	High	Low	Confidence of Reading	indistinct	multiples	halves	Best	High	Low	Confidence of Reading	
51	52	53	54	57	60	63	64	65	66	67	70	73	76	
CODE TABLES:						"READING, GENERAL"								
* Can not be blank						Note: _____								
"SPECIMEN, GENERAL"						Stock Code								
Preparator (1.19-20)						Microscope I.D. (1.40-41)								
Tooth Treatment (1.21)						Request Remount/Recut (1.33)								
Mounting Medium (1.22)						Pulp Cavity Condition (1.42)								
01 SLOAN 02 KIMURA 03 STANLEY 04 HOHN 05 BIOANALYSIS INC. 06 PERRIN, ET AL						01 EXCELLENT 2 VERY GOOD 3 GOOD 4 OK 5 MARGINAL 6 UNACCEPTABLE								
1 STAINED 2 UNSTAINED 1 PERMOUNT 2 GLYCERIN JELLY 3 GLYCERIN						'blank' NO ACTION 1 YES, REMOUNT 2 YES, RECUT 3 UNKNOWN								
01 PERRIN 02 HOLTS 03 CLAPP 04 SUANICO 05 COE 06 MYRICK 07 HENDERSON 08 KIMURA 09 SLOAN 10 HUI 11 SEAGARS 12 GUREVICH						13 MEAD 14 ODELL 15 STUART 16 KASUYA 17 BROWNELL 18 HOHN 19 20 21 22								
						77								

Figure 1. The Tooth Reading Record form used to record data from the Age Determination Project.

The results from the counts and other data collected on the Tooth Reading Record will be analyzed initially by a precision analysis designed by Dr. Steve Reilly, Operations Research Analyst, with assistance from Hohn and Myrick. This analysis will examine within- and between-reader variance and test for effects of factors which may affect the readings and account for any variance found. For example, refinements in preparation technique throughout the reading period may allow for determination of counting differences as a result of specimen preparation. The number of teeth read in a day, or number of days of consecutive reading, may indicate that fatigue is a factor. Inherent properties within a tooth, or the use of different teeth from an animal, may also be important.

When the ages for the specimens have been derived, age-specific vital rates studies will be conducted. A growth analysis, including an age-length

key and growth rate model, will be undertaken by Hohn with assistance from operations research analyst Dr. Jay Barlow. Age-specific reproductive parameters, such as pregnancy and nursing periods, will be estimated by Myrick. Barlow and Reilly will be working on estimating natural mortality rates. In addition, Reilly will use the age data to test for sampling bias in the life history data.

MARINE MAMMAL MONITORING AND ASSESSMENT PROGRAM

Research Cruise to Test Dolphin-Sighting Methods

On May 13, the NOAA research vessel, David Starr Jordan, departed on a 3-month cruise to the eastern tropical Pacific to conduct a dolphin-school census. The trip, which will end on August 3, will be conducted in three legs: San Diego, California to Manzanillo, Mexico; Manzanillo to Honolulu, Hawaii; and Honolulu back to San Diego. The cruise will concentrate on surveying the area along 10°N latitude from the Mexican coast to approximately 150°W longitude. The cruise, one of a series conducted in the eastern Pacific by the Southwest Fisheries Center to study the range and density of dolphin populations, is the first to be conducted in the summer months along the 10°N latitude area. Historically, this is the time of year when the tuna purse seine fleet has operated in this region.

Dr. Rennie Holt, Operations Research Analyst and Chief Scientist on the cruise, is testing a new method of estimating distances to sighted dolphin schools which relies on the rate of change of the angle between the school and the vessel's bow. The method was developed by Adamo, Inc. of San Diego, under contract to the SWFC and involves real-time computer analysis of the direction toward which the high-powered (25x) binoculars used to search for dolphins are pointing, along with measurements of vessel speed, roll, and pitch. This new method will resolve some of the questions about the reliability of cetacean census data from ship surveys, which have arisen in SWFC studies of dolphins in the eastern Pacific, in International Whaling Commission studies of minke whales in the Antarctic, and in joint U.S.S.R.-U.S. studies of dolphins in the Black Sea.

1982 Cumulative Dolphin Mortality Estimate Updated

Biological technician Bob Franco and statistician Bruce Wahlen have updated the 1982 estimate of cumulative dolphin mortality incidental to U.S. tuna purse seine fishing in the eastern tropical Pacific Ocean. The estimate through May 23 for all stocks with non-zero quotas is approximately 9,800 animals, which is nearly half of the 1982 annual quota of 20,500 animals. In 1981, a comparable level of total mortality was not attained until the end of June. Through May 23, the number of dolphins killed per day-fishing and per porpoise-set are about one-third and one-eighth higher, respectively, in 1982 than in 1981; the numbers of dolphin killed-per-ton of yellowfin tuna caught in association with dolphins are approximately equal for both years.

TUNA/BILLFISH RESOURCES PROGRAM

Center Hosts Seventh North Pacific Albacore Workshop

The Seventh North Pacific Albacore Workshop was hosted at the La Jolla Laboratory of the Southwest Fisheries Center, May 20-25, 1982. The workshop was the seventh in a series of scientific workshops begun in 1974 with an informal agreement between the Far Seas Fisheries Research Laboratory, Shimizu, Japan, and the Southwest Fisheries Center. In 1982, the informal agreement was extended to include the Pacific Biological Station, Nanaimo, Canada.



Participants in the Seventh North Pacific Albacore Workshop pose on the Center grounds (left to right): Ron Lynn, Southwest Fisheries Center; Mike Laurs, SWFC; Russ Porter, Pacific Marine Fisheries Council; Larry Hreha, Oregon Department of Fish and Wildlife; Barry Ackerman, Fisheries and Oceans Canada (F&OC); Dave Holts, SWFC; Brian Culver, Washington Department of Fisheries; Norman Bartoo, SWFC; Jerry Wetherall, SWFC; Keith Ketchen, F&OC; A. Ahn, Korean National Fisheries Administration; Susumu Kume, Far Seas Fisheries Research Laboratory, Japan; and Earl Weber, SWFC. (Not shown) Sam Bledsoe, Northwest and Alaska Fisheries Center, NMFS; Dick Parrish, SWFC; and Fred Hagerman, California Department of Fish and Game.

The workshop was attended by scientists from Japan, Canada, Korea, the States of Washington, Oregon, California, and the Southwest Fisheries Center who reviewed data on current fisheries for North Pacific albacore as well as analyses addressing the condition of the stocks.

The workshop's assessment was that the fishery appeared to be healthy, with declines in catch rates of the order expected for a high level of utilization. Maximum sustainable yield (MSY) range was thought to be 92,000-166,000 mt, with the 1981 catch set at about 75,000 mt. However, it was noted that MSY analyses are based on some rather tenuous assumptions and should not be considered very reliable. Concern was expressed for possible declines in parent stock which could affect recruitment.

The United States albacore fishery landed considerably more tonnage in 1981 (about 14,000 mt) than in the two previous fishing years with a considerably higher catch-per-effort than in the past years. However, the general trend in U.S. catches remains downward, as it has since 1972 (the time of the expansion of the Japanese pole-and-line fishery). In addition, the higher 1981 U.S. catch and catch-per-effort (CPUE) are due in part to offshore expansion of the U.S. fishery.

The Japanese 1981 pole-and-line fishery had its poorest year since 1970, with only 26,000 mt landed. Catch-per-effort in the fishery remained low, continuing a downward trend begun in 1975 (a drop of 60% in 7 years). The Japanese longline fishery catches remained at about the 15,000-mt level through 1981, with a relatively slight declining trend in CPUE. A new high-seas drift gillnet fishery for albacore took about 17,000 mt in 1981. No CPUE data are available yet.

(Additional details on the workshop can be found on page 13, this issue.)

Center Scientists Attend 33rd Annual Tuna Conference

Dr. Izadore Barrett, Center Director, and personnel of the Southwest Fisheries Center (SWFC) recently attended the 33rd Tuna Conference held at the University of California's Lake Arrowhead Conference Center, May 16-19, 1982. Traditionally, the Tuna Conference is open to anyone having an interest in tunas and tuna-like fish and the fisheries they support. It offers an opportunity for participants to communicate their ideas, research, and information to others who are similarly interested in tunas as a global resource. This year's conference was no exception, attracting more than 70 participants from the world-wide tuna community.

Dr. Samuel Herrick, Industry Economist with the SWFC's Tuna/Billfish Resources Program, chaired the 33rd session. The program included presentations covering: 1) current research on the population biology of tunas and tuna-like species and the contribution of this research to resource assessments and fishery evaluations; 2) current research on environmental factors influencing tuna abundance and availability; and 3) tuna fisheries development and management.

Four fishery biologists from the Tuna/Billfish Resources Program gave presentations at the Conference: Dr. Andrew Dizon spoke on geomagnetic orientation and navigation by tunas; Dr. Norman Bartoo and Earl Weber discussed the North Pacific albacore migration and fishery model; and Dr. Ron Rinaldo talked about the yield-per-recruit of Atlantic yellowfin tuna. Dr. Gary Sakagawa, Chief of the Oceanic Fisheries Resources Division, and Division scientists Dr. David Au, Al Coan, Tod Foster, Dave Holts, Tony Majors, and Dr. Steve Reilly also attended the Conference.

Dizon's presentation described research conducted on geomagnetic orientation and navigation by tropical tunas. He pointed out that perhaps more than any other migrating animals, pelagic fish need a reliable reference cue, and that there is none better for deep-swimming aquatic animals than those furnished by the geomagnetic field. It can provide not only compass direction but time cues and local piloting information to the sufficiently sensitive animal. While it has been shown that the earth's magnetic field influences behavior and orientation in a wide variety of organisms, there have been only a handful of studies demonstrating successful conditioning to magnetic fields. Most of these conditioned responses have been very difficult to obtain or have failed subsequent replication attempts. However, Dizon, together with Joseph Kirschvink of the California Institute of Technology, and Michael Walker, University of Hawaii graduate student working at the SWFC's Honolulu Laboratory, have shown that yellowfin, skipjack, and kawakawa tunas are easily conditioned to earth strength magnetic fields and that they possess magnetite in their ethmoid sinuses in sufficient quantities to serve as the basis for a highly sensitive magnetoreception system.

The presentation by Bartoo and Weber consisted of a demonstration of the video display capabilities of the North Pacific albacore migration and fishery model being developed by the SWFC's Tuna/Billfish Resources Program. The model generates substantial quantities of output from weekly simulations of North Pacific albacore migration and fishery activities. The video display provides a visual explanation of the results of these complex simulations which would otherwise be difficult to communicate by conventional methods. The demonstration was accompanied by an overview of the computer technology involved in the modeling effort and the status of its development.

Rinaldo presented some initial results of research currently underway on the sensitivity of yield-per-recruit (Y/R) estimates to changes in the structure of the reported catches. As a case in point, Rinaldo referred to changes in Y/R estimates for Atlantic yellowfin tuna prior to and following some rather large changes in the International Commission for the Conservation of Atlantic Tunas (ICCAT) historic catch data base. The procedure that Rinaldo is developing utilizes the mean and variance (assuming a normal distribution) of each catch-at-age taken from a historic age-catch data base. These parameters are then used to stochastically generate pseudo cohorts. Each of these is then analyzed individually for fishing mortality (F) vectors using virtual population analysis, and based on these results, a Y/R value is estimated for each of the pseudo cohorts. The procedure results in a range of normally-distributed Y/R estimates. Values obtained in this manner make it possible to test for significant differences in Y/R, given changes in the catch structure. Further refinements to this procedure are expected to yield

a relatively simple consistent approach to evaluating changes in Y/R , given changes in the underlying catch parameters. (Additional information on conference presentations is given on page 14, of this issue.)

TIBURON LABORATORY

FISH COMMUNITIES INVESTIGATION

Otoliths from Rockfish Sampling Program Processed

Dr. William Lenarz, Leader of the Rockfish Analysis Task, reports that his staff has eliminated the backlog of unprocessed otoliths from the rockfish sampling program. Otoliths from more than 50,000 rockfish have been collected from northern California landings as part of a cooperative sampling program conducted by the National Marine Fisheries Service and the California Department of Fish and Game (CDF&G). High priority was placed on eliminating the backlog of unread otoliths in order to satisfy the need for current age composition data under the soon-to-be-implemented Groundfish Management Plan.

Until recently, task members were ageing otoliths from all species. Early this year, however, CDF&G biologists assumed the responsibility of reading otoliths from bocaccio and chilipepper, two of the most important species of rockfish in California landings. Now it is routine to read otoliths within 3 months of the sample date. The time is reduced further when there is a need for more immediate feedback.

Lenarz has also completed the first draft of the Groundfish Management Team's update of the assessment of the widow rockfish stocks. Unless new important grounds are discovered, it appears that the stocks have been fished down to about maximum sustainable yield (MSY) levels, and that 1982 landings will not be as high as those in 1981. Approximations of MSY are considerably below the 1981 landings.

FISHERIES DEVELOPMENT INVESTIGATION

Minced Fish Experiments Conducted

This month members of the Fisheries Development Investigation conducted two experiments at the request of local seafood processors, to study the feasibility of using minced fish flesh from white croaker (*Genyonemus lineatus*) and from rockfish frames to make fishcake products. Fishery biologists William Leet, Sennen Salapare, and Sus Kato, and NOAA Corps Lt. Pat Rutten processed 100 lbs of white croaker at the Golden Sea Fisheries plant in San Francisco, California. The fish were headed and gutted, then washed and passed through a deboning machine which separated skin and bones from the minced flesh product. The mince was then rinsed in cold water and placed in a cloth bag. Excess water was removed by pressure under heavy weights. The yield of minced product, called "otoshimi" by the Japanese, amounted to 39% of the total weight of fish.

The otoshimi was sent to Yamasa Enterprises, a fishcake manufacturer in Los Angeles, California, where it was analyzed by Dr. Minoru Okada, a noted researcher from Japan. Dr. Okada found the mince unacceptable for top-grade kamaboko (steamed fishcake) products, probably due to the presence of myxosporidian parasites which produce protein-denaturing enzymes. The mince was satisfactory for deep-fried products, however, because quick cooking with high heat prevents enzyme activation. The price for raw material ("surimi") from Japan for fishcake products makes it uneconomical to use white croaker at this time. A second trial will be conducted later to learn if a better higher-priced product can be produced during a different season of the year.

In a second experiment, the researchers traveled to the Royal Seafoods plant in Monterey, California. For this trial, frames were obtained from freshly caught and filleted bocaccio and chilipepper rockfish. The head and guts were removed from 300 lbs of frames, which were then passed through the deboner and treated as before. Fifty-two pounds of mince, a 17% yield, were obtained from the frames. The mince was evaluated by Yamasa Enterprises and found acceptable for deep-fried products. However, the mince is currently worth only about 50 cents per pound, and even if the raw fish material is provided free, the high cost of processing the frames makes this project uneconomical at this time.

While in Monterey, the Tiburon Laboratory researchers worked on another product which may have commercial application. The collars and throat area of fish contain a substantial amount of flesh, and are commonly used in Japanese restaurants. To learn if rockfish collars could be marketed, the researchers prepared a sample of 10 lbs of collars and shipped it to Los Angeles, where it was prepared as "kasu-zuke," i.e., soaked in a paste made of sake (rice wine), sake lees, and sugar. The product was then packed and distributed to a few restaurants and caterers, who gave a favorable response. A larger sample will be tested, and price negotiations will be held after a local processor learns the costs involved.

Upgraded Squid Products to be Studied

Fisheries Development Investigation staff members will conduct research during the current squid fishing season on the economic feasibility of sorting squid by sex and size for market. Squid samples will be taken at 2-week intervals so that observations can be made on the effects of seasonality of sex ratio and size. Gravid female squid will bring a higher price than mixed-sex packs in the Japanese market, but sorting by sex will add to the cost of processing. The initial sex ratio of the catch will influence the yield of gravid females and thus the economic feasibility of sorting the product rather than random packaging. Larger squid command premium prices and it is more profitable to clean and sell the mantles of large males than those of gravid females because the yield is greater. In addition, the reproductive organs of females weigh up to 50% of the total weight of the squid, and they would have to be discarded if the squid were cleaned. Thus it is better to sell gravid females whole.

Initial sorting trials were held at Monterey this month to provide samples for a Japanese buyer. According to fishery biologist William Leet, female squid were sorted out and packed, and shipped to Los Angeles, where they were boiled and vacuum-packed in small packages. This product will be test-marketed in Japan in June. The purpose of cooking the squid is to avoid import restrictions which apply only to uncooked squid imported into Japan. These restrictions have the effect of raising the cost of imported squid in Japan.

Initially, sorting will have to be done by hand. If the economics are favorable, it is hoped that a mechanical sorter can be devised to take over much of the work.

PHYSIOLOGICAL ECOLOGY INVESTIGATION

Hudson River Striped Bass Collected for Comparative Studies

This month scientists from the Physiological Ecology Investigation took a one-week trip to West Point, New York, to examine 50 striped bass from the Hudson River. Dr. Jeannette Whipple, Investigation Leader, biological technicians Mike Bowers and Brian Jarvis, Sharon Moreland (San Francisco State University), and Dr. Mike Moser (parasitology consultant from the University of California, Santa Cruz) plan to compare their findings of the Hudson River fish with those from the California population. The trip was organized by east coast sportswriter Robert Boyle, and was sponsored by the Hudson River Fishermen's Association, Scenic Hudson, and Sloop Clearwater because of their members' concern with the condition of the Hudson River striped bass: in the past, these fish have had excessive levels of PCB's in the muscle and skin tissues.

Jarvis and Bowers, assisted by commercial fishermen, netted only 20 adult striped bass near the West Point area; the low yield of fish was attributed to the delayed spawning. These fish were transported to the West Point Laboratory facility for autopsy by Whipple and Moreland; Moser examined the striped bass for parasite infestation. Major John Robertson, a geochemist working on acid rain research, allowed the Physiology Group to use his laboratory.

Various tissue samples of these fish were taken for histology, petroleum hydrocarbons, serum protein, DDT, PCB's, and heavy metal analyses. A comparison of the Hudson River and California striped bass will be made at the conclusion of the analysis. In general, the striped bass from the Hudson River appeared healthier than those from California - they had fewer parasites, their eggs were in better condition, and the gall bladder and liver color were normal.

John Cronin, a commercial fisherman, collected and shipped an additional 20 striped bass to the Tiburon Laboratory for examination so that the Physiology Group will have a more accurate basis of statistical comparison between the two groups of fish.

* * * * *

Oceanographer Dr. Bruce MacFarlane has completed a paper on "The striped bass (*Morone saxatilis*) as an indicator of water quality in the San Francisco Bay-Delta system" which will be presented at the State of the Bay Conference in San Francisco, California, on June 4. This conference, sponsored by the Oceanic Society, plans to derive index numbers to describe the environmental condition of the Bay.

PACIFIC ENVIRONMENTAL GROUP

FISHERY/ENVIRONMENTAL MODELING AND FORECASTING TASK

Study of Regional Variations in Northern Anchovy Growth Rates and Age Composition Completed

Fishery biologist Dr. Richard Parrish, statistician Donna Mallicoate, and California Department of Fish and Game marine biologist Kenny Mais have completed a study of the regional variations in the growth rate and age composition of the northern anchovy. The data used in the study consisted of biological samples from 2670 midwater trawl hauls taken during 1966-1979 by the California Department of Fish and Game's Sea Survey Program. The principal regional variability in growth appears to occur during the juvenile stage; growth in adults shows much less regional variation. Juvenile growth is greatest in central California and in the offshore areas of the Southern California Bight. In the inshore regions, there is a continuous decline in juvenile growth from central California to southern Baja California. Average standard length at 1.5 years-old is 92-124 mm over this geographic range. Anchovies reach 124 mm in size at just over 3 years-old in the San Pedro Channel, at age 4 years in northern Baja California, while only a small proportion of older anchovies attain 124 mm in central Baja California.

Age composition was also found to have a marked geographical variation. Older anchovies predominate in central California, and young-of-the-year and yearling fish predominate in Baja California (Figure 1). Age composition was also found to be greatly influenced by depth. In the Southern California Bight, over 50% of the anchovies sampled in water less than 25 fathoms deep were young-of-the-year fish. The proportion of younger fish decreases rapidly with increasing depth and deepwater areas are dominated by older fish (Table 1).

Table 1. Age composition of anchovies taken in shallow and deepwater areas.

Depth (fm)	0-25	26-50	51-150	151-300	301-500	501-700	701+
Age (yr)							
0	50.8	16.4	10.7	6.2	5.4	2.5	1.9
I	22.5	26.3	26.9	21.3	20.7	14.5	10.0
II	10.8	24.6	27.1	25.0	26.1	25.6	20.6
III	9.9	16.9	20.7	24.4	22.7	29.4	26.7
IV	4.3	11.8	9.0	14.2	16.3	19.2	24.1
V	1.3	3.1	4.7	6.4	6.7	7.7	13.5
VI+	0.4	0.9	0.9	2.4	1.9	1.1	3.2
n	794	712	748	1250	2031	1318	569

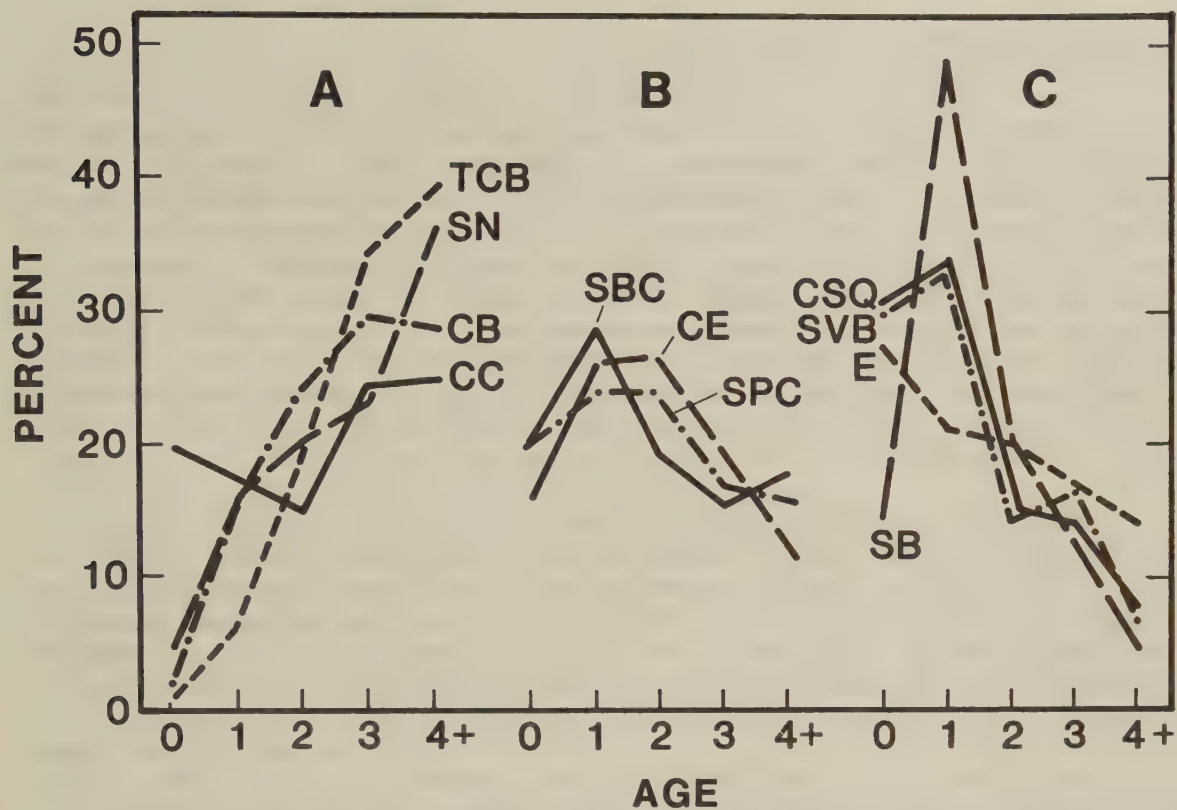


Figure 1. Age composition of anchovy taken in the following geographical regions: central California (CC), San Nicolas (SN), Tanner and Cortez Banks (TCB), Catalina Basin (CB), Santa Barbara Channel (SBC), San Pedro Channel (SPC), Coronado Escarpment (CE), Ensenada (E), Cape San Quentin (CSQ), Sebastian Viscaïno Bay (SVB), and southern Baja (SB). (Age is in years.)

FISHERIES INFORMATION SYSTEMS AND AUTOMATIC DATA PROCESSING

Computer System Equipment Purchased for CalFIN

Fred Kellenberger, Data Systems Manager, reports that funds from the Southwest Fisheries Center (SWFC) have been used to purchase an operating system for the California Department of Fish and Game (CDF&G) DEC 11/23 minicomputer in order to help implement operation of the California Fishery Information Network (CalFIN). The DEC 11/23 is upward compatible with the CDF&G larger DEC 11/70 mainframe. With the CDF&G purchase of a compatible disk drive for the DEC 11/23, CDF&G now has a complete second computer system that can serve as a backup to, and take some load off, the main CDF&G system. The DEC 11/23 system will support the licensing function and the in-season salmon reporting system during the move of the DEC 11/70 system from the CDF&G office in Long Beach to the CDF&G Rancho Cordona office in July. After that, the system will be used mainly to support the salmon catch statistics system.

Three terminals and three printers were also purchased with SWFC funds for use in CDF&G offices in Sacramento, Long Beach, and Eureka in order to improve the CDF&G data handling and programming capabilities. Plotting software was obtained for the Printronix printers, and an improved operating system was purchased for a TRS 80 microcomputer at Menlo Park. A plotter for the microcomputer will be ordered by CDF&G when the freeze on equipment purchases ordered by the Governor is lifted in July.

SWFC funds have also been used to hire seasonal clerks to reduce the backlog of CDF&G marine statistics fisheries data. During April, the 1979 California commercial fisheries statistics data editing was completed, and preliminary summaries of these data will soon be available. Preliminary summaries of the 1981 California fisheries statistics data were released in April. Since similar data for 1978 were released only a few months ago, the 1981 data release represents a giant step in reducing the amount of time needed to process these data for CalFIN.

WPACFIN Data Base Expanding

David C. Hamm, Computer Systems Analyst, reports that the Western Pacific Fishery Information Network (WPACFIN) continues to develop as data bases grow and additional planning is carried out. Computerization of historical landings and survey data is progressing well in the Pacific Island area (American Samoa, Guam, and Northern Marianas). With only one exception, the WPACFIN microcomputers have been functioning effectively in these areas for 4-5 months. The microcomputer installed in Guam had to be returned to Honolulu for repairs, but the entire downtime, including shipping, was only 10 days. Hamm has obtained and will be distributing special diagnostic program diskettes that will be used to help identify hardware problems in the field. This capability will allow shipping of parts to the field for replacement and thereby decrease the need for shipping the microcomputer to Honolulu for

repair. Hamm will provide additional hardware maintenance and repair training to the participating fisheries offices in the future.

Computer Equipment Prepared for Strategic Planning Workshops

Dorothy Roll, Systems Analyst, reports that ADP Operations will be responsible for configuring the computer equipment for the strategic planning workshops to be conducted by private consultant Dr. Alexander Christakis at the La Jolla Laboratory in June. The equipment consists of a CRT terminal with a printer and a video port which will drive two video monitors. Through a telephone hook-up, the terminal will access the Interpretive Structural Modeling (ISM) programs on the University of Virginia CYBER system. Susan Iacometti, Computer Systems Programmer, will be trained to use the ISM routines and will execute the programs during the workshop sessions.

Data Files Transferred from Burroughs to VAX System

Susan Iacometti, Computer Systems Programmer, is currently transferring the INFONET aerial survey data (1962 through 1980) from Burroughs tapes to the VAX computer system of the University of California, San Diego. She is also writing the total system and user documentation for the Aerial Marine Resources Monitoring System (AMRMS) and upon completion of the documentation will release the AMRMS to Rich Charter, CalCOFI Data Systems Manager, for update and maintenance.

In transferring the Coastwide Data System (CWDS) files from the Burroughs tapes to the UCSD VAX system, Iacometti encountered parity errors on the new disk assigned to her by the UCSD Computer Center. The consultants are now resolving the parity problems. Iacometti has designed a user file of the CWDS commercial landings data for Washington, Oregon, and California. The user file, tested and implemented for 1975, will be implemented for 1974 and 1976. To interact with the yearly landings files, Iacometti is creating yearly vessels files from the master vessel file. The user files were designed to assist Industry Economist Dr. Daniel Huppert and his associates in querying the files and using MINITAB for the analysis.

Robert Nydam, Computer Programmer Analyst, has transferred the numerous mailing label files from the Burroughs to the VAX. On the Burroughs system, the mailing labels were generated from backup tape at the UCSD Computer Center. With the transfer to the VAX system, key operator Ruth Toles can generate labels on-site from the GE Terminet printer or the Xerox Diablo printer.

ADP Personnel Attend Regional Federal ADP Council Meeting

This month data systems manager Fred Kellenberger, systems analyst Dorothy Roll, computer specialist Rich Charter, computer systems programmer Susan Iacometti, computer programmer analyst Robert Nydam, and John Davies

(Southwest Region, NMFS) traveled to Port Hueneme, California, to attend the meeting of the Federal ADP Council for Southern California and Arizona held on May 17. Edward Pidgeon from Result Company, based in El Cajon, California, was the featured speaker, delivering an address on the "Art of implementing change" during the morning session and one on "Results-oriented management" during the afternoon session. Roll, who has served as Treasurer for the Council during the past year, has been re-elected to this position for fiscal year 1983.

Requirements for Reporting Full-Time Equivalence Implemented

This month Robert Nydam, Computer Programmer Analyst, completed testing the Full-Time Equivalency (FTE) data entry and update programs which will meet the new requirements for the Financial Reporting System. He is implementing the FTE requirement in the May TDP month-end summary and is using specifications provided by executive officer Ben Remington to design, code, and test the two new FTE reports. The implementation of these reports is targeted for the June summaries.

Technical Users Meeting Held in May

ADP Operations hosted one technical users meeting this month. On May 6, Edgar Bruguera, sales representative for TAB Products Company, presented the numerous features of the TAB 132/15, a CRT smart terminal. Some of the unique features are the larger 15-inch screen and the soft keys used for user programmable function keys. Through the courtesy of TAB Products, a TAB 132/15 terminal has been placed in the computer workroom on a no-charge trial basis.

Data System at Tiburon Laboratory Upgraded

A Contial Data Corporation Cyber 18 Remote Job Entry (RJE) system has been delivered and installed at the Southwest Fisheries Center's Tiburon Laboratory; the Laboratory's current configuration is card-oriented. The RJE will be upgraded to a small mini-computer in the future. A high-speed data phone communication link between the host computer at the Lawrence Berkeley Laboratory (LBL) and the Tiburon Laboratory has been installed.

Lt. (jg) Fred Plotkin, NOAA Corps, on assignment as computer programmer to the Tiburon ADP task, has created another program in a series to provide graphic output utilizing the graphics packages available at LBL. This series now contains four production programs that create X-Y plots and histograms on various media, including 35 mm film and microfiche, as well as paper plots.

MISCELLANEOUS

HONORS AND AWARDS

On May 13, Dr. Izadore Barrett, Center Director, nominated the following papers, authored by members of the Southwest Fisheries Center staff, for NMFS Outstanding Publication awards of papers published in 1981:

I. For the best papers in the U.S. Fishery Bulletin:

1. Gooding, Reginald M., William H. Neill, and Andrew E. Dizon. 1981. Respiration rates and low-oxygen tolerance limits in skipjack tuna, Katsuwonus pelamis. Fish. Bull., U.S. 79:31-48.
2. Laurs, R. Michael, and Jerry A. Wetherall. 1981. Growth rates of North Pacific albacore, Thunnus alalunga, based on tag returns. Fish. Bull., U.S. 79:293-302.
3. Uchiyama, James H., and Paul Struhsaker. 1981. Age and growth of skipjack tuna, Katsuwonus pelamis, and yellow-fin tuna, Thunnus albacares, as indicated by daily growth increments of sagittae. Fish. Bull., U.S. 79:151-162.
4. Hunter, J. Roe, and Roderick Leong. 1981. The spawning energetics of female northern anchovy, Engraulis mordax. Fish. Bull., U.S. 79:215-230.
5. Webb, P. W. 1981. The effect of the bottom on the fast start of a flatfish Citharichthys stigmaeus. Fish. Bull., U.S. 79:271-276.

II. For the best papers in Marine Fisheries Review:

1. Matsumoto, Walter M., Thomas K. Kazama, and Donald C. Aasted. 1981. Anchored fish aggregating devices in Hawaiian waters. Mar. Fish. Rev. 9:1-13.
2. Cramer, J.L., R.M. Nakamura, A.E. Dizon, and W.N. Ikehara. 1981. Burnt tunas: Conditions leading to rapid deterioration in the quality of raw tuna. Mar. Fish. Rev. 6:12-16.

Honolulu Laboratory

Richard S. Shomura, Director of the Honolulu Laboratory, was named Chairman of the Standing Committee on Resource Research and Development

(SCORRAD) of the Indo-Pacific Fishery Commission (IPFC), at the SCORRAD meeting held in Sydney, Australia, this month.

La Jolla Laboratory

On May 10, an awards ceremony was held at the La Jolla Laboratory and Dr. Izadore Barrett, Center Director, presented many staff members with certificates and cash awards. Dr. Barrett also presented three employees with length-of-service emblems: Dr. John R. Hunter, Fishery Biologist, was honored for 20 years' federal service; Dr. R. Michael Laurs, Oceanographer, was honored for 15 years' service; and Jack Metoyer, Biological Technician, was honored for 25 years' service.

Many staff members shared a unit award which honored them for their contribution to the development of a new estimation procedure for anchovy biomass assessment. This unique method permits the estimation of biomass from the ratio of the egg production rate in the sea to the daily fecundity of the spawning fish stock. Although this technique has just begun to be implemented for the northern anchovy, the major fish population in California and Mexico Pacific waters, scientists view the method as being potentially applicable to a wide variety of pelagic fishes. The Scientific and Statistical Committee of the Pacific Fishery Management Council has reviewed the technique and has agreed in principle to its incorporation into the Northern Anchovy Management Plan, the guide for setting anchovy fishing quotas in the coastal waters of the U.S. Pacific Coast. The technique has also been adopted in Peru for the estimation of the spawning biomass of the Peruvian anchoveta.

The development of the "egg production method" required the knowledge and skills of many researchers conducting a wide variety of studies on sampling, statistical methodology, and fish biology, ecology, behavior, and physiology. Dr. Reuben Lasker, Chief of the Coastal Fisheries Resources Division and Division scientists investigated for many years the biology of the larval and adult anchovy in relation to its environment. Dr. John Hunter and his staff determined the frequency of spawning in laboratory-reared adult females and provided the measurements of anchovy batch fecundity. Dr. Geoff Moser and the late Dr. Elbert Ahlstrom worked with their staff to stage accurately anchovy egg development. To help determine the rate of egg production in the sea, Dr. Paul Smith designed a new, fast, vertically-towed plankton net which captured eggs but excluded large volumes of plankton which interfere with counting and sorting anchovy egg samples; Smith also determined the number of samples that had to be taken to give the most accurate picture of number of newly-spawned eggs. James Thrailkill planned the anchovy-study cruises and supervised the sampling aboard ship. Richard Charter instituted a new innovative data management system to handle the prodigious amount of data collected during the sampling work, and Dr. Gary Stauffer and Alec MacCall produced the first trial

Center Director Dr. Izadore Barrett congratulates Jack Metoyer upon Metoyer's award of a 25-year length-of-service emblem.



Dr. John Hunter receives a 20-year length-of-service emblem from Dr. Barrett.



Dr. Mike Laurs accepts an emblem from Dr. Barrett which marks Laurs' 15 years of federal service.



biomass estimate using the new procedure. Each of these developments was achieved through the cooperative efforts of the staff members who work within the various Coastal Division research programs.

The award recipients who appear in this photograph each made an important contribution towards the development of the egg production method. They are (from left to right): Reuben Lasker, Frances Pocinich, John Hunter, Alec MacCall, Barbara Sumida-MacCall, Eric Lynn, Elaine Sandknop, Paul Smith, Susan Picquelle, Scott Miller, Elizabeth Stevens, Jim Thrailkill, Roger Leong, Susan Longinotti, Richard Charter, Nancy Lo, Larry Eber, Carol Kimbrell, Lee Innes-Brown, Mary Farrell, Lucy Dunn, Jack Metoyer, Alice Lumpkins, Geoff Moser, Dmitry Abramenkoff, Jean Haddox and Bill Flerx.



Those who shared this unit award but do not appear in the photograph include: Morgan Busby, John Butler, Joe Caruso, Lucy Dunn, Susan D'Vincent, Connie Fey, Steven Goldberg, Sharon Hendrix, Sandor Kaupp, Richard Kiy, Bev Macewicz, Ken Mais, Ragan Nicholl, Keith Parker, and Gary Stauffer.

PUBLIC AFFAIRS

Honolulu Laboratory

On May 25, a reporter from television station KITV (Channel 4) interviewed Richard S. Shomura, Director of the Honolulu Laboratory, for a series which the station is producing on the current fishery situation in Hawaii. Shomura talked primarily about the status of the various fishery resources in the central and western Pacific Ocean. Channel 4 telecast the interview during the evening of May 25.

La Jolla Laboratory

On May 10, fishery biologist Dr. R. Michael Laurs gave a presentation dealing with recent research findings on albacore tuna to the San Diego Sportsfishing Association. Laurs' talk highlighted information on albacore migration patterns based on results from tagging studies, satellite remote sensing applications concerning albacore, and general information on albacore biology. Fishery biologist Dr. Norman Bartoo also participated in the meeting, giving an overview of the fisheries that are conducted on albacore in the North Pacific. The presentations were well received by the 50 sportsfishermen attending the meeting.

SEMINARS

La Jolla Laboratory

- May 4 - Dr. Stephen D. Ferris, Stanford University, gave a talk on "Genetic variation in animal populations revealed by mitochondrial DNA."
- 11 - Alec MacCall, California Department of Fish and Game, presented a seminar on "Dynamic biogeography."
- 14 - Dr. Greg Cailliet, Moss Landing Laboratory, Moss Landing, California, gave a seminar on "Elasmobranch life history and the problem of over-exploitation."
- 20 - Dr. Peter Miyake, Assistant Executive Secretary, International Commission for the Conservation of Atlantic Tunas (ICCAT), spoke on "Development and management of Atlantic tuna fisheries."

TRAINING

La Jolla Laboratory

- March 29- - Dave Holts and Tony Majors, Fishery Biologists, and
May 24 Charles Oliver, Computer Specialist - "FORTRAN
Programming," La Jolla, California.
- May 11-13 - Daisy Gaston-Akinwanile, Budget and Accounting Technician -
"Automatic Data Processing Orientation," Los Angeles,
California.
- 12 - Mary DeWitt, Editorial Assistant
Susan Iacometti, Computer Systems Programmer
Jacqueline Jennings, Fishery Biologist
Nancy LaRoche, Secretary
Susan Picquelle, Statistician
Lorraine Prescott, Supervisory Editorial Assistant
Dorothy Roll, Systems Analyst, and
Priscilla Sloan, Biological Technician - all attended
"Professional Development for Women," San Diego, California.
- 14 - Julie Shoemaker and Francis Tonsich, Secretaries - "Seminar
for Secretaries and Administrative Assistants," San Diego,
California.
- 17-18 - Helen Becker, Editorial Assistant - "Negotiation Skills,"
San Diego, California.
- 18-19 - Gabriele Lichlyter, Clerk-Typist - "Sharpening Your English
Skills," San Diego, California.

Tiburon Laboratory

- May 13-14 - Pete E. Benville, Research Chemist - "Hewlett-Packard
BASIC Programming Course 5880A/3388A," Santa Clara,
California.

VISITORS

Honolulu Laboratory

- May 11 - Dr. Roger Uwate of the East-West Center, Honolulu, Hawaii,
visited Laboratory Director Richard Shomura to discuss a
research proposal.

- Dr. Pierre Kleiber, Senior Fisheries Scientist with the South Pacific Commission's Skipjack Tagging Programme, met briefly with Richard Shomura.
- 24 - Dr. Donald Thompson, Professor of Zoology at the University of Arizona, visited the Laboratory. Dr. Thompson was a former employee of the Honolulu Laboratory from 1957 to 1961 while he was working on his Ph.D. at the University of Hawaii.
- 25 - Laboratory Director Richard Shomura and Dr. Richard Brill provided a tour of the Honolulu Laboratory's Kewalo Research Facility to Professor Caleb Olaniyan of the Department of Biological Sciences, University of Lagos, Nigeria, and Mrs. Olaniyan.
- William Ripley of New York visited Laboratory Director Richard Shomura to discuss recent developments in the FAO Tuna Data Center located in Sri Lanka.

La Jolla Laboratory

- May 5 - Ruben Morales, Ciencias Marinas, Ensenada, Baja California, Mexico.
- Rolla Williams and Judy Windle, San Diego Union, San Diego, California.
- 10 - Jorge Montufar, Chairman of the Fisheries Committee of the Chamber of Deputies, Guerrero, Mexico, visited the Center and met with Center Director Dr. Izadore Barrett, Dr. Reuben Lasker, and Dr. Gary Sakagawa.
- Mike A. McCoy, Micronesian Maritime Authority, and Richard Croft, State Fisheries Officer, Ponape, East Caroline Islands.
- 11 - Rick Stauration, California Institute of Technology, Pasadena, California.
- E. Thornton Ibbetson and W.F. Macrote, Southern California Tuna Club, Long Beach, California.
- 17-20 - Larry Senechal, NASO Personnel Division, came to the Center to participate in the NOAA Junior Fellow Selection Committee meeting.
- 19 - Phil Meyer of Meyer Associates came to the Center to meet with Dave Mackett, Planning Officer.

- 24 - Dennis Hedgecock, Bodega Marine Lab, Bodega Bay, California.
- 25 - John Hinman, NOAA, NASO, Seattle, Washington.

Tiburon Laboratory

- May 4 - Betsey Pratt, Woods Hole Oceanographic Institution, Woods Hole, Massachusetts.
- 6 - Roland Lomberson, Humboldt State University, Arcata, California.
- 7 - Lynn Stenzel, Point Reyes Bird Observatory, Stinson Beach, California.
- 18 - F.M. Corbelli, Tyee Club, San Francisco, California.
- 24 - Tom Jow, California Department of Fish and Game, Menlo Park, California.
- 25 - Susan Anderson, University of California, Davis, California.

Pacific Environmental Group

- May 25 - Mark Jury, Electricity Supply Commission, Cape Town, South Africa, discussed work in relation to PEG's eastern boundary current study with Andrew Bakun.

MEETINGS AND TRAVEL

Honolulu Laboratory

- May 5 - Laboratory Director Richard Shomura returned to Honolulu after visiting the Fisheries Research Division, Ministry of Agriculture and Fisheries, Wellington, New Zealand, and attending the Standing Committee on Resource Research and Development (SCORRAD) meeting, as the official U.S. Delegate at Sydney, Australia.
- 7 - Richard Shomura attended the Hawaii Fisheries Coordinating Council meeting at the Hawaii Department of Land and Natural Resources.
- 11 - Richard Shomura met with Svein Fougner, Executive Director of the Western Pacific Regional Fishery Management Council

(WPRFMC), and Henry Sakuda, Director of the Hawaii State Aquatic Resources Division, to discuss spiny lobster and other WPRFMC matters.

- 16-19 - Dr. Robert A. Skillman traveled to California to attend the 33rd Annual Tuna Conference at Lake Arrowhead.
- 16-30 - Dr. Jerry A. Wetherall traveled to California to attend the 33rd Annual Tuna Conference at Lake Arrowhead and the North Pacific albacore workshop at the La Jolla Laboratory.

La Jolla Laboratory

- May 6 - Center Director Dr. Izadore Barrett and Dr. Reuben Lasker attended a CalCOFI meeting held at Scripps Institution of Oceanography, La Jolla, California.
- 10 - A general staff meeting was held at the Center.
- 10-11 - Fred Kellenberger traveled to Portland, Oregon, to attend a Data Goals meeting and to meet with staff members of the Pacific Marine Fisheries Council.
- 10-12 - Dr. Izadore Barrett, Center Director, traveled to Portland, Oregon, to attend the Pacific Fishery Management Council's SSC meeting.
- 10-13 - Dr. Daniel Huppert traveled to Portland, Oregon, to attend Pacific Coast Fisheries Data Committee, Pacific Fishery Management Council, and SSC meetings.
- 12-13 - Charles Oliver continued his pinniped studies at San Clemente Island, California.
- 12-14 - Dr. Gary Sakagawa traveled to Panama City, Panama, to attend a meeting of U.S. and Panamanian officials on a new convention for the conservation of eastern tropical Pacific tunas.
- 13 - Dr. Izadore Barrett attended an Underwater Park Meeting in La Jolla, California.
- 13-17 - Aleta Hohn traveled to Sarasota, Florida, to participate in ongoing research by Michael Scott, Inter-American Tropical Tuna Commission, and Randy Wells, University of California, Santa Cruz, to investigate long-term social associations and habitat use of bottlenose dolphins.
- 16-18 - Fred Kellenberger traveled to Port Hueneme, California, to attend the Federal ADP Council meeting, and to Terminal

Island, California, to meet with personnel from the Southwest Regional Office, NMFS, and the California Department of Fish and Game.

- 16-19 - The following Southwest Fisheries Center personnel from the La Jolla Laboratory traveled to Lake Arrowhead, California, to attend the 33rd Annual Tuna Conference: Dr. Izadore Barrett (Center Director), John Carr (Deputy Director), Dr. David Au, Dr. Norm Bartoo, Al Coan, Dr. Andrew Dizon, Tod Foster, Doyle Hanan (CDF&G), Dr. Sam Herrick, Dave Holts, Jacqueline Jennings, Dr. Mike Laurs, Tony Majors, Dr. Ron Rinaldo, Dr. Gary Sakagawa, Lillian Vlymen, and Earl Weber.
- 16-22 - John Butler traveled to La Paz, Mexico, to give a series of lectures on age determination techniques at CICIMAR.
- 18-19 - The NOAA Junior Fellow Selection Committee met at the Center.
- 20-25 - The 7th North Pacific Albacore Workshop was held at the Center.
- 23-27 - Deputy director John Carr traveled to Lansing, Michigan, to participate in a review of the Department of Fisheries and Wildlife, Michigan State University, for the Department of Agriculture.
- 26-27 - Chuck Oliver traveled to San Clemente Island, California, to continue studies on pinnipeds.
- 26-28 - Mark Lowry traveled to San Clemente Island, California, to conduct a pinniped census and to collect scat samples for a food habits study.

Tiburon Laboratory

- April 23- - Dr. Bruce MacFarlane traveled to Pensacola, Florida, to
May 3 attend a workshop on meaningful measures of marine pollution effects.
- May 5-6 - Pat Rutten, NOAA Corps, traveled to Ft. Bragg, California, to transport experimental crab traps to fishermen.
- 10-12 - Tony Chess and Dr. Edmund Hobson traveled to Mendocino, California, to conduct a quarterly sampling series.
- 11-13 - William Leet, Sennen Salapare, Pat Rutten, and Sus Kato traveled to Monterey, California, to process some seafood products.

- 17-20 - Norman J. Abramson, Laboratory Director, traveled to Long Beach, California, to survey sampling methods used by the California Department of Fish and Game.
- 20-21 - Tina Echeverria traveled to Ft. Bragg, California, to update and review sampling techniques with field sampling personnel.
- Pat Rutten and Sennen Salapare traveled to Ft. Bragg, California, to sample commercial smelt fishery catches and obtain market samples.

Pacific Environmental Group

- April 18- - Dr. Richard Parrish traveled to Paris, France, to attend
May 3 a meeting of the International Oceanographic Commission's (IOC) Working Group 67, and to Casablanca, Morocco, and Santa Cruz de Tenerife, Spain, to collaborate with French and Spanish scientists concerning pelagic fishes in Eastern Boundary currents.
- May 13 - Dr. Roy Mendelssohn traveled to Davis, California, to give an invited seminar at the University of California.
- 16-19 - Paul Sund traveled to Lake Arrowhead, California, to attend the 33rd Annual Tuna Conference.
- 18-21 - Donna Mallicoate traveled to La Jolla, California, to discuss methods of dealing with statistical data files with Dr. Rick Methot, La Jolla Laboratory.
- 20-21 - Dr. Richard Parrish traveled to La Jolla, California, to attend the 7th Annual Albacore Meeting, held at the Center.

PERSONNEL ACTIONS

Honolulu Laboratory

- May 3 - Walter M. Matsumoto, Fishery Biologist - Promotion.
- Gail A. Peiterson, Biological Technician (Wildlife) - Full-time, Temporary Appointment.
- 11 - Anne M. Houtman, Biological Aid - Conversion to Temporary Appointment.

- Ruth L. Ittner, Biological Technician (Wildlife) - Part-time, Temporary Appointment.
- 12 - Mark A. Scheele, Computer Programmer - Conversion to Temporary Appointment.
- 16 - Thomas S. Hida, Fishery Biologist - Promotion.
- 17 - Graydon A. Keala, Biological Aid - Part-time, Temporary Appointment.
- Daniel R. Locey, Computer Science Student Trainee - Promotion and Return to Duty.
- 24 - Stephen V.D. Ralston, Fishery Biologist - Full-time, Permanent Appointment.
- Fredrick V. Schlexer, Wildlife Biologist - Full-time, Temporary Appointment.
- 26 - James C. Cooper, Computer Assistant - Conversion to Temporary Appointment.

La Jolla Laboratory

- May 2 - David Ambrose, Biological Laboratory Technician - Full-time, Temporary Appointment.
- Tom Polacheck, Fishery Biologist - Extension of Temporary Appointment.
- 4 - William Sullivan, Cash and Attendance Clerk - Redescription.
- 10 - Martha Brown, Writer-Editor - Excepted Appointment.
- Amy Kimball, Biological Aid (NOAA Jr. Fellow) - Excepted Appointment.
- Ragan Nicholl, Biological Technician - Temporary Appointment.
- 16 - William Ginty, Computer Assistant - Temporary Appointment.
- 19 - Victorio Gorospe, Biological Aid - Temporary Appointment.

Tiburon Laboratory

- May 17 - Carol Reilly, Fishery Biologist - Excepted Appointment.

UNITED STATES
DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
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